

In the winter of 1932, W. B. Murbarger, of Kaweah, Calif., (in Tulare County about 30 miles north of Camp Nelson), sent specimens of a xystodesmid millipede to the Smithsonian Institution for identification, with the note that the animals were luminescent. Dr. O. F. Cook examined them and found all to be immature, impossible to identify, and requested additional specimens of Mr. Murbarger. These were sent, with a letter, on March 31, 1932, but apparently they also were young, for Dr. Cook, who was greatly interested in identifying the first known luminescent millipede and discussed it with the senior author, made no notes or comments on them, and no further attempts seem to have been made to secure adults.

Following identification of the foregoing Camp Nelson species, it now seems quite likely that Murbarger's specimens were *L. sequoiae*, and extracts from his two letters are of special interest. In his letter of February 24, 1932, he states that "these worms were taken beneath an oak tree and apparently were under no other trees in this locality (Kaweah, Tulare County, Calif.) Elev.

about 3,000 feet. Their one peculiarity is that at night they are luminous and visible for some distance." When Dr. Cook requested additional specimens he mentioned that the emission of light by the animals might be limited to a particular season, but in replying on March 31, Murbarger wrote: "As to their emission of light being confined to certain seasons, I cannot say. I first noticed them the past December. At no time since then have they failed to be luminous in the dark. During the daytime they can only be found under moist boards, logs and the like but at night they seem to roam about in the leaves, under trees and like retreats. Regarding the color of living specimens, I have sketched the accompanying crude diagram. Younger ones are of a whiter, more transparent color, no yellow being present, but in all sizes and ages the dark line down the back is noticeable." In his very creditable sketch the first segment is indicated as being buff colored and the "back gray-yellow, shading to bright yellow on the serrated edge." If Murbarger's specimens actually were *L. sequoiae*, it appears that this species remains luminescent from December to mid-May at least.

ZOOLOGY.—A new crayfish of the genus *Procambarus* from Louisiana, with a key to the species of the *Spiculifer* group. HORTON H. HOBBS, JR., Miller School of Biology, University of Virginia. (Communicated by Fenner A. Chace, Jr.)

Three species of the *Spiculifer* Group (Hobbs, 1942:119) of the genus *Procambarus* have been described from the southern United States, and their combined ranges extend from eastern Louisiana to the Altamaha River drainage in Georgia; of the three, *P. spiculifer* (LeConte, 1856:401) has the largest range, having been reported from Mississippi, Alabama, Georgia, and northern Florida; *P. versutus* (Hagen, 1870:51) from Mississippi, Alabama, and Florida; *P. vioscai* Penn (1946:27) from Louisiana and Mississippi.

The species belonging to the *Spiculifer* group may be readily distinguished from the other members of the genus by possessing the combination of an areola less than 28 per cent of the entire length of the carapace, and two lateral spines on each side of carapace immediately caudad of the cervical groove.

Members of this group are all inhabitants of streams and are more abundant in those

having a moderate current. Although there are few data available to indicate what factors in the environment limit their distribution to lotic situations, there is evidence that it is their inability to live in waters in which oxygen content is low. All these species have a broad areola (thus presumably a proportionally smaller gill chamber than do those species having a narrow one), and in American crayfishes, exclusive of the members of the genus *Cambarellus*, this feature is correlated with a lotic habitat. There is no evidence to suggest that the limiting factors in their ecological distribution are concerned with type of bottom, size of stream, pH, or hardness of the water, for both *spiculifer* and *versutus* have been taken from widely different types of streams.

The first specimens I saw of the species described below were collected by Percy Viosca from Talisheek, St. Tammany Parish, La., and have been deposited in the United States National Museum. Additional speci-

mens were sent to me by Dr. Edward C. Raney, of Cornell University, and I wish to thank him not only for these specimens but also for the many fine additions he has made to my collection.

I take great pleasure in naming this species in honor of Dr. George H. Penn, Jr., a mutual friend of Mr. Viosca's and mine, who has contributed much to our knowledge of the crayfishes of Louisiana.

*Procamburus penni*, n. sp.

*Holotypic male, form I.*—Body subovate, compressed laterally; abdomen longer than carapace (35.6–32.1 mm). Height of carapace slightly greater than width in region of caudodorsal margin of cervical groove (13.9–13.2 mm); greatest width of carapace a little cephalad of caudodorsal margin of cervical groove.

Areola relatively broad (4.2 times longer than wide) with four or five punctations in narrowest part. Cephalic section of carapace about 3.2 times as long as areola (length of areola about 23.6 per cent of entire length of carapace).

Rostrum long, excavate; sides subparallel to base of acumen which is set off by acute lateral spines. Acumen almost half as long as remainder of rostrum (5.0–11.4 mm). Margins of rostrum not swollen or conspicuously elevated. Upper surface bearing numerous small setae. Subrostral ridges poorly developed and not evident in dorsal aspect.

Postorbital ridges prominent, grooved laterad and terminating cephalad in acute spines. Suborbital angle almost obsolete, branchiostegal spine strong. Two strong acute lateral spines present on each side of carapace; upper surface of carapace punctate; lateral portion caudad of cervical groove granulate.

Cephalic section of telson with three spines in left and four in right caudolateral corners. Epistome with a small cephalomedian spine (see Fig. 8).

Antennules of the usual form with a strong acute spine present on ventral side of basal segment.

Antennae reaching caudad to middle of telson. Antennal scale long, of moderate width; widest cephalad of middle; outer distal margin with a strong spine.

Chela subovate, somewhat depressed, long and slender. Hand entirely tuberculate; tubercles beset with conspicuous plumose setae. Inner

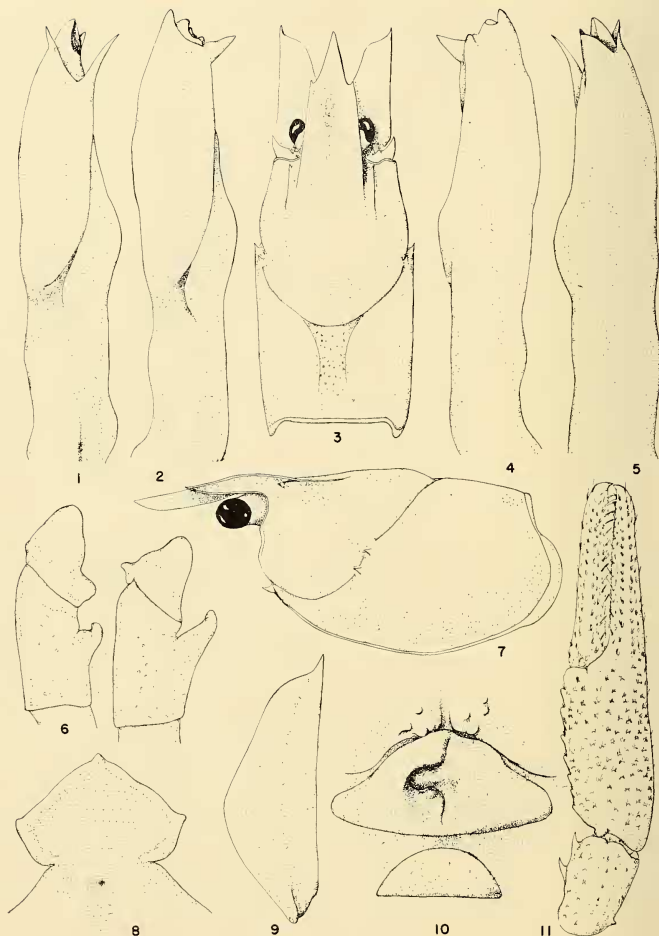
margin of palm with a row of six tubercles, a prominent tubercle present on lower surface of palm at base of dactyl. Opposable surface of dactyl with four rounded tubercles on basal third, otherwise with crowded minute denticles; upper surface of dactyl with a few small setiferous tubercles at base, otherwise with setiferous punctations; lower and mesial surfaces similar to upper. Opposable margin of immovable finger with four tubercles on basal third and one large tubercle on lower opposable margin at midlength, otherwise entire opposable margin with minute denticles; other surfaces of finger with setiferous punctations. Both fingers with weak submedian ridges on upper and lower surfaces.

Carpus of first right pereiopod longer than wide (7.8–4.3 mm), shorter than inner margin of palm of chela (10.3 mm), with a shallow oblique groove above. Surface mesiad of groove with two longitudinal rows of five subsquamous tubercles; surface laterad of groove with setiferous punctations; mesial surface with two spike-like tubercles and a few additional small and scattered ones; lateral and lower surfaces with setiferous punctations; distal margin of lower surface with two prominent spines.

Merus of first right pereiopod punctate laterad and proximomesiad; mesiodistal surface with small tubercles; laterodistal surface with an acute spine; upper surface with small tubercles, and near distal end with two spikelike tubercles. Lower surface with an outer row of nine tubercles, only three of which are conspicuous, and a mesial row of 15; a few additional small tubercles flank these two rows.

Hooks present on ischiopodites of third and fourth pereiopods; hooks on third long and slender and only slightly recurved; hooks on fourth somewhat more stocky and strongly recurved. Basipodite of fourth pereiopod with a swelling opposite hook on ischiopodite. Coxopodites of fourth and fifth pereiopods with caudomesial projections: that on fourth heavy and inflated, that on fifth considerably smaller and somewhat compressed cephalocaudad.

First pleopod reaching cephalic side of coxopodite of third pereiopod when abdomen is flexed. Tip terminating in four distinct parts. Mesial process spiculiform and directed caudodistad. Cephalic process lying cephalomesiad of central projection, subacute, and extending slightly cephalomesiad. Caudal element consisting of three parts: caudal knob in lateral aspect acute



FIGS. 1-11.—*Procamburus penni*, n. sp.: 1, Mesial view of first pleopod of holotype; 2, mesial view of first pleopod of morphotype; 3, dorsal view of carapace of holotype; 4, lateral view of first pleopod of morphotype; 5, lateral view of first pleopod of holotype; 6, basipodites and ischiopodites of third and fourth pereopods of holotype; 7, lateral view of carapace of holotype; 8, epistome of holotype; 9, antennal scale of holotype; 10, annulus ventralis of allotype; 11, upper view of carpus and chela of holotype. (Pubescence removed from all structures illustrated except in Fig. 11.)

and noncorneous; caudal process slender, sub-lanceolate, and excavate caudad; accessory process extends across the proximocaudal face of the caudal process and central projection as a thin corneous ridge. Central projection corneous truncate distad, with fusion line of its two components clearly marked.

*Paratypic male, form II.*—Similar in most respects to the holotype, except in the reduced secondary sexual characters and in the distribution of a few spines. First pleopod with all processes reduced and noncorneous; caudal and adventitious processes not distinguishable in the caudal element; caudal knob very prominent (see Fig. 4).

*Allotypic female.*—This specimen, although badly mutilated, is the only specimen in this collection in which the annulus ventralis contained a sperm plug. The annuli of the more perfect specimens appear somewhat underdeveloped; therefore I have chosen this specimen with the "mature" annulus as the allotype. Annulus ventralis with a submedian depression; sinus originates slightly dextrad of midventral line about one-third of the length of the annulus from cephalic margin, extends dextrad and makes a hair-pin turn to the midventral line where it turns caudad and terminates directly caudad of its origin just cephalad of caudal margin of annulus. Sternum cephalad of annulus deeply cleft along median line; on each side of median cleft is a swollen tuberculate prominence which extends caudoventrad and obscures extreme cephalolateral margins of annulus.

*Measurement.*—As follows (in millimeters):

|                        | <i>Holotype</i> | <i>Allotype</i> | <i>Morphotype</i> |
|------------------------|-----------------|-----------------|-------------------|
| Carapace               |                 |                 |                   |
| height.....            | 13.9            | 11.6            | 12.8              |
| width.....             | 13.2            | 11.6            | 12.1              |
| length.....            | 32.1            | 27.6            | 30.0              |
| Areola                 |                 |                 |                   |
| length.....            | 7.6             | 6.3             | 7.3               |
| width.....             | 1.9±            | 1.6             | 2.2               |
| Rostrum                |                 |                 |                   |
| length.....            | 11.4            | 10.3            | 10.7              |
| width.....             | 5.1             | 4.7             | 5.1               |
| Abdomen                |                 |                 |                   |
| length.....            | 35.6            | 30.8            | 32.2              |
| Right chela            |                 |                 |                   |
| length of inner margin |                 |                 |                   |
| of palm.....           | 10.3            | 5.1             | 7.0               |
| width of palm.....     | 6.0             | 3.7             | 4.8               |
| length of outer margin |                 |                 |                   |
| of hand.....           | 25.0            | 13.5            | 18.3              |
| length of dactyl.....  | 12.8            | 7.1             | 10.0              |

*Type locality.*—Talisheek Creek, at Talisheek, St. Tammany Parish, La., a tributary of the

Pearl River. The creek is small (not more than 20 feet wide), spring-fed and sand-bottomed and rises in the longleaf-pine hills a short distance north of Talisheek. Here, for the most part, it is shallow with a few deep holes (4 or 5 feet deep). Vegetation is sparse, but debris collects in the holes and on the lee side of sandbars and behind logs.

The above information was kindly communicated to me by Dr. Penn, who consulted Mr. Viosca, the collector of the type specimens.

*Disposition of types.*—The holotypic male, the allotypic female, and the morphotypic male (nos. 91662, 91663, 91664) together with paratypes consisting of 6♂♂ II, 3♀♀, 2♂♂ immature, and 8♀♀ immature from the type locality are deposited in the United States National Museum. A series of paratypes (1♂ I, 3♂♂ II, 1♀, and 1♀ immature) collected from a tributary of Black Creek, 7.9 miles west of Hattiesburg, Lamar County, Miss., by Dr. E. C. Raney are in the collection of Dr. George H. Penn, Jr., Tulane University. The following paratypes are in my personal collection at the University of Virginia: HHH no. 3-3048-5a (1♂ I, 2♂♂ II, 7♀♀, 10♂♂ immature, and 7♀♀ immature) from a tributary of the Pearl River, 8 miles north of Angie, Marion County, Miss., on Route 7 [E. C. Raney, coll.]; HHH no. 6-1549-1 (2♂♂ I), 9.6 miles east of Franklinton, Washington Parish, La. [R. D. Suttkus, coll.].

*Range.*—Insofar as is known at present this species is confined to tributaries of the Pearl and Pascagoula Rivers in eastern Louisiana and south-central Mississippi.

*Relationships.*—*Procambarus penni* has its closest affinities with *P. vioscai* but may readily be distinguished from it by the more acute caudal process of the first pleopod of the first form male.

KEY TO THE SPECIES OF THE SPICULIFER GROUP  
(Based on the first-form male)

1. Cephalic process of first pleopod rudimentary or lacking.....*spiculifer*  
Cephalic process of first pleopod well developed..... 2
2. Mesial process of first pleopod terminating proximad of tip of caudal element; rostrum with median carina.....*versutus*  
Mesial process of first pleopod extending beyond tip of caudal element; surface of rostrum concave..... 3
3. Mesial process extending caudolaterad; caudal knob rounded distally in lateral aspect.....*vioscai*  
Mesial process extending caudodistad; caudal knob subacute in lateral aspect.....*penni*

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BOTANY.—*A new fern of the genus Danaea from Colombia*.<sup>1</sup> C. V. MORTON, U. S. National Museum.

The small genus *Danaea*, of the family Marattiaceae, is one of the few genera of ferns confined to the Western Hemisphere. It prefers to grow in moist, dark, tropical forests, where it is often one of the most conspicuous terrestrial plants. Because of the lack of clear morphological characters, the species are not well understood. One of the plants collected in Colombia by Kjell von Sneider represents a new species, described below.

*Danaea tenera* Morton, sp. nov.

Rhizoma crassum, breviter repens, ca. 3.5 cm longum, 1 cm diam.; stipulae magnae, crassae, latae, integrae. Folia sterilia paripinnata, 22-30 cm longa, stipitibus crassis, 8-11 cm longis, 2-4 mm diam., inconspicue 2-nodosis, ubique dense paleaceis, paleis brunneis, minutissimis, suborbicularibus, denticulatis; rhachis compressa, supra nuda, subtus dense et minute brunneo-paleacea, utrinque perspicue viridi-alata, gemma terminata; pinnae tenuiter membranaceae, 12-14-jugae, breviter petiolulatae (1-2 mm), anguste oblongae, 4-6 cm longae, 10-15 mm.

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latae, apice gradatim acuminatae, basi obli-  
quae, basi superiore cuneatae, inferiore ro-  
tundatae, apicem versus perspicue et argute  
uncinato-serratae, deorsum paulum undula-  
tae; venae simplices vel plerumque geminae  
(raro furcatae), 12-14 per cm; lamina supra  
glabra et epaleacea, subtus mesophyllo et  
praecipue in costis paleacea, paleis valde  
diversis, alteris mediocribus, orbicularibus  
vel deltoideis, alteris minutissimis, dissectis  
vel piliformibus. Folia fertilia ignota.

Type in the U. S. National Herbarium, no. 1742723, collected at La Costa, Department of El Cauca, Colombia, April 1937, in virgin forest, at 1,000 meters elevation, by Kjell von Sneider (no. 1578).

In its very thin texture *D. tenera* suggests the genus *Trichomanes*, and in this character recalls only *D. crispa* Endres and *D. trichomanoides* Moore. It may be related to the latter, but that species differs (from description) in having smaller, obtuse, merely undulate pinnae; in *D. tenera* the pinnae are long-acuminate and remarkably sharply serrate toward apex. It is not certain whether the leaves of *D. trichomanoides* are abruptly pinnate (as in the present species) or imparipinnate.